Maternal Fetal Medicine (MFM)

Royal Brisbane and Women's Hospital

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Referral Guidelines for Antenatal Ultrasound and MFM Consultation

Metro North Health
Queensland Government

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INTRODUCTION

This guide is for maternity care providers to assist with referral decisions for antenatal ultrasound and Maternal Fetal Medicine (MFM) consultations at the Royal Brisbane & Women's Hospital (RBWH).
All requests for antenatal ultrasound or MFM consultation require a *RBWH Maternal Fetal Medicine (MFM) Referral for Imaging and Consult.*

All referrals to MFM MUST be accompanied by all ultrasound and blood results

CONDITIONS

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Dating of Pregnancy

Accurate dating is important to pregnancy management. Accurate dating by ultrasound scan (USS) is best performed in the first trimester and all women should be offered a dating USS. The accuracy of dating by USS reduces later in pregnancy.

MFM **DOES NOT** provide early pregnancy dating USS. Women should be referred by their GP to a local Radiology provider.

Scenario	Context	Recommended action
Unknown or uncertain Last menstrual period (LMP) after the first trimester	It is important to determine the estimated date of confinement (EDC), preferably in the first trimester Dating from a third trimester USS is not recommended and if performed will have an accuracy+/-2-3 weeks	Refer to a local Radiology provider for USS at around 8 weeks gestation (or as soon as possible if presenting after first trimester) to determine EDC

First Trimester Screening for Chromosomal Abnormalities

All pregnant women should be counselled about screening and diagnostic tests for chromosomal abnormalities.

The combined first trimester screen (CFTS) is performed between 11+0 and 13+6 weeks which corresponds to a crown rump length (CRL) of 45-84mm in length. It combines the nuchal translucency (NT) measurement with maternal serum Papp-A and BHCG levels and maternal age to give an adjusted possibility for Trisomy 21, 18 and 13. The blood test can be performed between 11+0 and 13+6 weeks gestation.

Please note that in women with renal impairment, maternal serum BHCG and Papp-A are unreliable and should not be used.

Alternatively, women may be offered Non-Invasive Prenatal Testing (NIPT) from 10 weeks gestation.

Women choosing to have NIPT, or declining aneuploidy risk assessment, should be offered an USS without risk assessment at 12 – 14 weeks gestation for early fetal anatomy assessment.

Scenario	Context	Recommended action
<13+6 weeks pregnant and not previously offered screening for chromosomal abnormalities.	CFTS is available at local Radiology and Women's Imaging providers. Women booked in at RBWH can be referred to RBWH Department of Medical Imaging (DMI) using the RBWH Women's Imaging Request form Women of advanced maternal age (38 years old or greater) or with a previous history of aneuploidy should be referred to MFM	If high probability result (>1:300) discuss further testing with the patient **If >1:100, NIPT is not recommended, refer to MFM** If 1:101-300 offer NIPT. If NIPT low probability, reassure. If high probability, or declining NIPT and wanting definitive diagnostic testing, refer to MFM **If NT >3.5mm or any structural anomaly noted, refer to MFM**
Maternal diabetes and <13+6 weeks	Biochemistry is not as reliable in diabetic women with renal impairment HbA1c >6.5% correlates with an increased incidence of structural anomalies	As per above Discuss the reduced sensitivity of CFTS in women with renal impairment. Discuss the benefits of NIPT vs CFTS in these women. Ensure first trimester HbA1c for all patients with pre-existing diabetes Women with type I or type II diabetes should be referred to MFM for ultrasound at 12+5-13+6 weeks gestation +/- aneuploidy screening
>13+6 weeks pregnant and not previously offered screening for chromosomal abnormalities.	Dating by USS is needed. Offer NIPT (high sensitivity)	If high probability result refer to MFM. If low probability result but the patient requests definitive diagnostic testing, refer to MFM If declining NIPT and requesting diagnostic testing, refer to MFM for consultation
Twin (or higher order multiple) pregnancy <13+6 weeks	Biochemistry is used as usual in CFTS for twin pregnancy Biochemistry is not reliable in higher order multiple pregnancy (triplets and above), therefore the risk calculation should be based on NT measurement and maternal age only NIPT can be offered in twin pregnancies. NIPT in higher order	Higher order multiples should be referred to MFM as early as possible after dating scan demonstrating live intrauterine pregnancy Monochorionic twins (MCDA or MCMA) should be referred to MFM as early as possible after dating scan demonstrating live intrauterine pregnancy

	multiples is not currently validated, although can be reported by some platforms	
NIPT requested	NIPT can be ordered by Doctors and Private Practice Midwives NIPT is only provided by private Pathology providers There is no Medicare or Private Health Fund rebate for NIPT Patients should be advised of the cost of the test All women should have a first trimester scan for assessment of fetal anatomy. This is regardless of whether they have CFTS or NIPT or choose no first trimester aneuploidy screening	If high probability result or USS abnormality, refer to MFM If maternal weight >100kg consider delaying NIPT to 12 weeks to avoid inconclusive tests resulting from low fetal fraction
Scenario	**Context**	**Recommended action**
Low Papp-A (<0.40 MoM) result on CFTS	Increased possibility of fetal growth restriction, pre-eclampsia, stillbirth, abruption	Morphology scan can be performed at local Radiology provider or RBWH DMI at 19-20 weeks, and further ultrasound for biometry with uterine artery Dopplers at 24 weeks at RBWH DMI If high resistance or notched uterine artery Doppler measurements at 24 weeks, recommend growth ultrasound at 28, 32 and 36 weeks If uterine artery Doppler measurements are normal, then repeat USS 32 and 36 weeks
Increased nuchal translucency (≥3.5mm) with normal karyotype or declined invasive testing	This is associated with increased possibility of congenital cardiac malformations, skeletal dysplasia and some genetic syndromes (in addition to aneuploidy)	Refer to MFM. MFM USS +/- amniocentesis/CVS and fetal echocardiography (at 24 weeks) as required will be arranged by MFM

Second Trimester Fetal Anomaly/Morphology USS (19+0 to 20+6 weeks)

All pregnant women should be offered a morphology USS to screen for structural abnormalities.

Scenario	Context	Recommended action	Recommended future action
All women <22 weeks who have not had a fetal anomaly USS	The fetal anomaly USS **should not** be used as a screening test for Down syndrome (Trisomy 21)	Discuss benefits and limitations of fetal anomaly USS Provide parent information brochure if appropriate Advise of appropriate pathway for testing through GP or ANC Fetal anomaly USS can be performed at a local Radiology provider or RBWH DMI at 20 weeks **Women with a high probability CFTS/NIPT, NT >3.5mm, significant maternal medical problems or previous structural anomalies should be referred to MFM for their fetal anomaly USS**	
Incomplete fetal anomaly USS	Women who have a fetal anomaly USS where not all fetal anatomy is adequately visualised	Discuss benefits and limitations of fetal anomaly USS Where views are limited by fetal position, the local centre should attempt, on a second occasion, to complete the fetal anomaly USS Where the fetal anomaly USS remains incomplete after local repeat ultrasound, referral to MFM is recommended	
Fetal abnormality identified or suspected on outside USS	It is appropriate that women who have a fetal anomaly either detected or suspected are referred for a tertiary fetal anomaly USS **A soft marker is not considered an anomaly**	Discuss benefits and limitations of fetal anomaly USS Refer for tertiary fetal anomaly USS in MFM stating suspected anomaly. Approximate detection rates in **tertiary** setting for structural fetal abnormalities are as follows: - Open NTD >90% - Cardiac - 75% - CNS - 75% - Oro-facial clefts - 75% - Abdominal wall defects >90% - GIT - 50% - Genitourinary - 50% - Thorax - 75% - Limbs/bones – 75%	No further action required if results are normal If abnormality confirmed counselling will be provided in MFM including appropriate alterations to antenatal care and management

		Arrange antenatal appointment to review results and determine obstetric team management	
Scenario	**Context**	**Recommended action**	**Recommended future action**
Suspected cardiac abnormality		All women with a suspected or detected cardiac anomaly should be referred for a tertiary fetal anomaly ultrasound.	
Renal pelvis dilatation Considered dilated if: ≥7mm up to 28 weeks ≥10mm after 28 weeks	Renal pelvis dilatation is a marker for renal tract abnormality, obstruction or ureteric reflux Progression to significant dilatation antenatally is considered low if dilatation measures less than 10mm Where a local Radiology provider reports that the renal pelvises are “prominent”, the measurement should be reviewed with the reporting Radiologist and only referred for further USS if meeting criteria for dilated	If dilatation is >7mm at <28 weeks refer to MFM If dilatation is ≥10mm at any gestation, provide a referral to MFM	

Soft Markers identified at 16 to 22 weeks

A soft marker is not a structural anomaly but is a documented USS feature which has previously been reported in association with fetuses affected with chromosomal abnormalities. In women at low risk of chromosomal abnormality based on a prior screening test (CFTS, NIPT or triple test), isolated soft markers are not considered of clinical significance and do not require further ultrasound follow up.

The fetal anomaly USS **is not** considered a screening test for Down Syndrome.

All pregnant women should be counselled about screening and diagnostic tests for chromosomal abnormalities. The relevance of soft markers is to be interpreted in the context of the prior screening risk assessment.

Soft Marker	Context	Recommended action
Echogenic bowel	Associated with fetal growth restriction, fetal infection (e.g., CMV), cystic fibrosis, structural bowel abnormality, chromosomal abnormality and maternal vaginal bleeding in pregnancy It may also be idiopathic	Maternal bloods for: - CMV, Toxoplasma serology - CFTR gene mutation test in woman **and partner** (for parental cystic fibrosis carrier status) **Refer** for tertiary USS and counselling in MFM
Absent/ Hypoplastic Nasal Bone at 18-22 weeks	Associated with chromosomal abnormalities (Down Syndrome)	Refer for tertiary morphology USS and counselling in MFM
Nuchal fold >/= 6mm at 18-22 weeks	Associated with chromosomal abnormalities, genetic syndromes and congenital cardiac abnormalities	Refer for tertiary morphology USS and counselling in MFM
Isolated single umbilical artery	Association with structural and chromosomal anomalies	If normal morphology ultrasound and low risk aneuploidy screening recommend growth ultrasound at 34-36 weeks Offer NIPT if no prior screening. If high probability NIPT or structural anomaly on morphology ultrasound, refer to MFM
Isolated Echogenic intracardiac focus	Not considered of clinical significance if prior low possibility screening test result.	If low risk aneuploidy screening, reassure. This does not require further ultrasound follow up Offer NIPT if no prior screening If high probability NIPT, or declining NIPT and wanting further consultation, refer to MFM
Isolated Choroid plexus cyst	Not considered of clinical significance if prior low possibility screening test result	Offer NIPT if no prior screening If high probability NIPT, or declining NIPT and wanting further consultation, refer to MFM

Short femur or humerus	Associated with chromosomal abnormalities, growth restriction and skeletal dysplasia	If FL <5th centile and low risk aneuploidy screening, recommend third trimester growth ultrasound to exclude late fetal growth restriction and ensure interval growth of the long bones If FL or HL <5th centile and no prior aneuploidy screening, no interval growth in FL over subsequent ultrasounds, other structural anomalies, or polyhydramnios, refer to MFM
Soft Marker	**Context**	**Recommended action**
Multiple soft markers	Associated risk of chromosomal abnormality determined by combination of soft markers	If multiple soft markers, refer to MFM for review

Placenta

Visualisation of the cervix in relationship to the placenta may require transvaginal USS (TVS) assessment.

Definitions: Low lying placenta is defined as placental edge ≤20mm from internal cervical os.

Placenta praevia is defined as placenta covering the internal os of the cervix in the third trimester.

Scenario	Context	Recommended action
Low lying placenta reported at the fetal anomaly USS or later	Placental position should always be reported on the fetal anomaly USS	In pregnancies without risk factors, refer to **local Radiology provider for ultrasound** for growth and placental assessment USS at 34-36 weeks If placenta is anterior and low lying in the presence of prior uterine surgery such as caesarean section, recommend ultrasound, at local Radiology provider, at 28 weeks to exclude ultrasound features of placenta accreta spectrum If ultrasound features suggestive of placenta accreta spectrum refer to MFM
Placenta praevia reported on third trimester USS		Clinical management including delivery planning of placenta praevia should be individualised with input from the Obstetric Team consultant Not an indication for referral to MFM
APH during 3rd Trimester	Placenta praevia should always be excluded in cases of an APH in the 3rd trimester even if an USS prior to the 3rd trimester has not reported a low-lying placenta **Abruption cannot be excluded on ultrasound as it is a clinical diagnosis**	Refer to ORC (Obstetric Review Centre) at RBWH for initial assessment Following clinical assessment, if stable, ultrasound is indicated for growth and placental assessment. Refer to DMI for this ultrasound unless known SGA or obstetrically high risk, in which case MFM referral is warranted
Increased risk of placenta accreta spectrum (accreta/increta/percreta) if meets the following criteria: - Placenta praevia identified on USS - Placenta is anterior and low-lying with history of prior uterine surgery	Risk of placenta accreta spectrum increases with prior uterine surgery	Refer for local USS at 28 weeks to exclude ultrasound features of placenta accreta spectrum If placenta accreta spectrum is suspected on external ultrasound, refer to MFM for further assessment. Further imaging will be arranged as necessary The sensitivity and specificity of MRI is similar to tertiary USS in diagnosis of placenta accreta spectrum. Do not refer for MRI prior to MFM review

Cervix

Assessment of cervical length as a predictor of preterm labour.

Women **with** symptoms of threatened preterm labour (TPL) are assessed for risk of preterm birth. Women **with high risk factors without** symptoms of TPL are assessed for risk of preterm birth.

The cervix is routinely assessed trans-abdominally (TA) as part of the fetal anomaly USS. If it is not well seen or appears shortened, TVS will be performed.

Scenario	Context	Recommended action
Women with the following risk factors are at high risk for preterm labour - Previous 2nd trimester miscarriage - Previous preterm birth <34 weeks - Cone biopsy - Multiple cervical surgeries - Uterine anomalies	Risk of preterm labour in women without symptoms of TPL is significantly increased if cervical length is ≤ 15 mm up to 24 weeks If cervical length <35mm on TA USS, a T/V ultrasound should be performed to confirm it is >25mm Absence of appropriate T/V scan in the setting of TA measurement <35mm necessitates completion of screening and is not an indication for tertiary referral	Refer for TV ultrasound assessment and serial monitoring of cervical length from 16 weeks to 24 weeks If TV cervical length <25mm, clinical review by treating Obstetric Consultant recommended to discuss risk reduction strategies If TV cervical length <15mm at <24weeks (new diagnosis, without cerclage in situ), refer to MFM for further ultrasound and counselling regarding potential benefit of cervical cerclage
Threatened preterm labour	Risk of preterm birth (within seven days) in women with symptoms of TPL is significantly increased if cervical length is ≤ 20 mm up to 34 weeks	Refer to ORC for cervical length assessment +/- quantitative fetal fibronectin (fFN) and QUiPP app From 28 weeks the measurement of the cervical length in asymptomatic women is not indicated as not predictive of preterm birth
Cervical assessment in multiple pregnancy at fetal anomaly/morphology scan		TA assessment is routine TVS performed if indicated i.e., cervix <35mm on TA USS Management of cases with evidence of cervical shortening are consultant led within the obstetric team as the evidence is limited. MFM consultation to be considered

Multiple Pregnancy

Chorionicity should be determined in all cases as it affects subsequent pregnancy management.

All twin pregnancies are at higher risk of structural and chromosomal anomalies as well as pre-term birth.

Serial monitoring is indicated in all multiple pregnancies as listed below.

DCDA – Dichorionic Diamniotic

MCDA – Monochorionic Diamniotic

MCMA - Monochorionic monoamniotic

TTTS – Twin to Twin Transfusion syndrome

Scenario	Context	Recommended action
Multiple pregnancy with unknown chorionicity	Chorionicity determines risk status within multiple pregnancies	Chorionicity should be determined based upon the earliest performed ultrasound. This determination becomes more difficult after 20 weeks If uncertainty regarding chorionicity, or late booking, refer to MFM for USS
DCDA twins	Increased risk of structural or chromosomal anomaly and fetal growth restriction	Local ultrasound every 4 weeks from 20 weeks indicated for growth and Dopplers MFM referral if complicated DCDA twins; discordant abnormality and/or fetal growth discordance >/=25%
MCDA twins	MCDA twins are at risk of, twin-twin transfusion syndrome (TTTS), twin anaemia polycythaemia sequence (TAPS) and selective fetal growth restriction (sFGR)	Refer to MFM for serial USS every 2 weeks from 16 - 28 weeks Local USS may be appropriate after 28 weeks, following initial consultation with MFM More frequent USS surveillance as indicated in USS report
MCMA twins	In addition to the above potential complications of monochorionicity, MCMA twin also carry a risk of cord entanglement	Refer to MFM for serial USS every 2 weeks from 16 weeks, and antenatal care. High risk for cord entanglement therefore aim to deliver at 32 – 34 weeks unless other indication for delivery earlier
Higher order multiples	Higher order multiples are at increased risk of pregnancy complications	Refer to MFM for clinical review, counselling and ultrasound following dating ultrasound

Fetal growth and wellbeing assessment (Biometry, Doppler assessment, and Amniotic Fluid)

Clinical assessment of symphysis-fundal height (SFH) is appropriate for outpatient screening for fetal growth concerns, but ultrasound assessment is required to make a formal diagnosis of small for gestation age (SGA) or large for gestational age (LGA).

USS is an appropriate method for the assessment of fetal growth. Serial monitoring is required to reliably demonstrate growth velocity. Growth assessment at ultrasound is not reliable if performed at an interval less than 10 days at a minimum. Growth assessment at ultrasound should include fetal biometry, amniotic fluid assessment by Deepest Vertical Pocket (DVP normal range 2-8cm) and Doppler assessment (at least UA Dopplers).

The aetiology and outcomes of small for gestational age and fetal growth restriction differ significantly. Any fetus demonstrated to have an Abdominal Circumference (AC) or Estimated Fetal Weight (EFW) <10th centile on ultrasound warrants Maternal Fetal Medicine consultation and ultrasound to help guide ongoing risk and management.

In a known SGA or growth restricted fetus from 34 weeks, USS assessment should be utilised along with CTG and clinical assessment in ongoing monitoring of fetal wellbeing.

SGA – Small for gestational age
LGA – Large for gestational age
EDF – End diastolic flow
AEDF – Absent End diastolic flow
REDF – Reversed End diastolic flow
AFI – Amniotic Fluid Index
EFW – Estimated Fetal Weight
FGR – Fetal growth restriction

Scenario	Context	Recommended action
High risk for fetal growth restriction due to the presence of one or more risk factors	Previous pregnancy complicated by growth restriction, stillbirth, abruption <34 weeks or pre-eclampsia Any current medical illness associated with vascular pathology (e.g. hypertension, kidney disease, SLE, pre-pregnancy diabetes)	Refer to MFM for growth and wellbeing scan from 24 weeks
Clinically suspected SGA in low-risk women	Symphysis fundal height (SFH) measurement plotted on growth chart demonstrates slowing of growth, or isolated SFH measures <3cm less than gestational age Referral should indicate the urgency for scanning based on fetal movements and any antenatal complications	Refer to local Radiology provider or RBWH DMI
Confirmed SGA (EFW or AC <10th centile)	EFW or AC <10th centile detected on outside/RBWH DMI USS	Request TORCH screening (CMV, toxoplasmosis, syphilis) and antiphospholipid screens Review CFTS/NIPT results Refer to MFM for repeat USS, counselling and management planning If abnormal Dopplers, oligohydramnios, decreased fetal movements or other clinical concerns, call MFM directly to expedite triaging and assessment

Scenario	Context	Recommended action
Suspected LGA fetus or polyhydramnios in the non-diabetic mother	Symphysis fundal height (SFH) measurement plotted on growth chart demonstrates accelerated growth	Refer to RBWH DMI for fetal growth and well-being USS
Gestational diabetes:	Gestational diabetes is associated with accelerated fetal growth	Refer for fetal growth and well-being USS at 34 -36 weeks gestation at Local Radiology provider or RBWH DMI unless other obstetric risk factors

Maternal Obesity

Obese women (BMI >40) are more likely to have fetal anomalies (e.g., neural tube defects) but they are less likely to be diagnosed antenatally due to poor image quality. Clinical assessment of fetal size is also unreliable in these women.

Scans can be performed by local Radiology provider or RBWH DMI and referred to MFM if structural anomalies identified.

In the event of an incomplete morphology ultrasound, it is appropriate for the local imaging provider to re-attempt ultrasound on one occasion prior to tertiary review.

Maternal Medical Conditions

Pre-existing medical conditions may increase the risk of antenatal complications including pre-eclampsia and fetal growth restriction. There is an increased risk of fetal structural anomaly associated with some maternal medical conditions and medications.

First trimester screening can be performed by local Radiology provider or RBWH DMI and referred to MFM if structural anomalies identified

Tertiary **morphology** ultrasound is indicated with a Maternal history of:

- Congenital cardiac disease
- Epilepsy on multiple antiepileptic medications
- Prior major fetal structural anomaly
- T1DM or T2DM with elevated HbA1c >6.5%

Some maternal medical conditions carry a risk of placental vascular malperfusion and resulting fetal growth restriction. In this case local screening (CFTS and morphology) is appropriate, with referral for tertiary growth ultrasounds from 24 weeks, for conditions including:

- Pre-existing maternal T2 diabetes:
    - HbA1c <6.5%: local/DMI CFTS and morphology appropriate. Refer to MFM for 24-week ultrasound growth and cardiac assessment. If normal, local growth ultrasounds can be recommended at 30 and 36 weeks.
- Autoimmune (SLE, RA, APLS)
- Inflammatory Bowel Disease (Ulcerative Colitis/Crohn's)
- Essential hypertension (medicated)
- Epilepsy (medicated)
- Maternal renal disease (IgA nephropathy, CKD)
- Congenital cardiac disease
- Graves' disease
- Gastric bypass

Prior history of severe early onset FGR or PET (<32wks)

Termination of Pregnancy

Referral for termination of pregnancy (ToP) should be directed to Metro North Central Patient Intake.

GLOSSARY OF TERMS

AEDF	Absent End Diastolic Flow	MCDA	Monochorionic Diamniotic
AFI	Amniotic fluid index	MCMA	Monochorionic Monoamniotic
AFP	Alpha-Fetoprotein	MFM	Maternal Fetal Medicine
ANC	Antenatal Clinic	MoM	Multiple of the Median
APH	Antepartum Haemorrhage	NIPT	Non-Invasive Prenatal Testing
BHCG	Beta Human Chorionic Gonadotropin	NT	Nuchal Translucency
BMI	Body Mass Index	NTD	Neural Tube Defect
CFTR gene	Cystic Fibrosis Transmembrane Conductance Regulator gene	OGTT	Oral Glucose Tolerance Test
CFTS	Combined First Trimester Screen	Papp-A	Pregnancy associated plasma protein A
CMV	Cytomegalovirus	Quantitative fFN	Quantitative fetal fibronectin
CNS	Central Nervous System	QUiPP app	A tool to predict spontaneous preterm birth, incorporating fetal fibronectin and cervical length
CRL	Crown Rump Length	REDF	Reversed End Diastolic Flow
CS	Caesarean Section	SFH	Symphysis fundal Height
DCDA	Dichorionic Diamniotic	SGA	Small for Gestational Age
DMI	Department of Medical Imaging	sIUGR	Selective IUGR
EDC	Estimated Date of Confinement	SLE	System Lupus Erythematosus
EDF	End Diastolic Flow	TA	Transabdominal
EFW	Estimated Fetal Weight	TORCH	Toxoplasmosis, Other, Rubella, Cytomegalovirus (CMV) and Herpes Infections
GDM	Gestational Diabetes Mellitus	TPL	Threatened Preterm Labour
GIT	Gastrointestinal	TTTS	Twin to Twin Transfusion Syndrome
GP	General Practitioner	TVS	Transvaginal Scan
IUFD	Intrauterine Fetal Death	UA	Uterine Artery
IUGR	Intrauterine Growth Restriction	uE3	Estriol
LMP	Last Menstrual Period	USS	Ultrasound Scan
LNMP	Last Normal Menstrual Period		